R E P O R T R E S U M E S

ED 003 828 24

VERBAL SKILLS OF SUPERIOR STUDENTS.

BY- ROTHNEY, JOHN W.M. SANBORN, MARSHALL P.
WISCONSIN UNIV., MADISON

REPORT NUMBER CRP-S-036 PUB DATE 65
EDRS PRICE MF-$0.18 HC-$2.36 59P.

DESCRIPTORS- *HIGH SCHOOL STUDENTS, GRADE 10, GRADE 12, *VERBAL ABILITY, *VERBAL TESTS, HIGH ACHIEVERS, LEARNING PROCESSES, TESTING, *SUPERIOR STUDENTS, *STUDENT IMPROVEMENT, MADISON, WISCONSIN

THE VALUE OF A NEW PROCEDURE FOR ASSESSING VERBAL PERFORMANCES OF SUPERIOR HIGH SCHOOL STUDENTS WAS STUDIED. THE INSTRUMENT CONSISTED OF TWO PARTS. IN PART A, THE STUDENT WAS GIVEN AN ANALOGY AND ASKED TO IDENTIFY THE MOST LOGICAL RELATIONSHIP BETWEEN THE TWO ELEMENTS IN IT. HE WAS THEN ASKED TO WRITE A DESCRIPTION OF THE RELATIONSHIP IDENTIFIED. PART B REQUIRED THE STUDENT TO CONSTRUCT AN ANALOGY STATEMENT COMPARABLE TO THE ONE GIVEN. PART A WAS DESIGNED TO STUDY THE STUDENT'S REASONING BEHIND THE ANALOGY HE PRODUCED IN PART B. IT WAS HYPOTHESIZED THAT ITEMS OF THIS NATURE MIGHT HELP DIFFERENTIATE STUDENTS CAPABLE OF ORIGINAL PERFORMANCE FROM THOSE WHO BECOME SKILLED IN RECOGNITION AND RECALL TASKS. EXPERIMENTAL ANALOGIES ITEMS WERE ADMINISTERED TO 143 10TH-GRADE AND 130 12TH-GRADE STUDENTS (MALES AND FEMALES). MEAN SCORES OF BOTH SOPHOMORES AND SENIORS WERE ALMOST TWICE AS HIGH ON ANALOGY RECOGNITION AS ON PRODUCTION. MEAN SCORES FOR BOYS AND GIRLS AT BOTH GRADE LEVELS SHOWED NEGLIGIBLE DIFFERENCES. IT WAS CONCLUDED THAT SCORES ON BOTH PARTS OF THE TEST WERE ASSOCIATED WITH GRADE IN SCHOOL WHICH IN TURN IS ASSOCIATED WITH AGE AND EXPERIENCE. HOWEVER, RESULTS IN PRODUCTION INDICATED LITTLE IMPROVEMENT FROM THE 10TH TO THE 12TH GRADES. (AL)

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

VERBAL SKILLS OF SUPERIOR STUDENTS

Cooperative Research Project No. S-036

John W. M. Rothney

and

Marshall P. Sanborn

University of Wisconsin
Madison, Wisconsin
1965

The research reported herein was performed pursuant to a contract with the Cooperative Research Program of the United States Office of Education, Department of Health, Education, and Welfare.

ED 003828

PREFACE

This report covers one phase of a long-term project at the Research and Guidance Laboratory of the University of Wisconsin that has required and will require the cooperative efforts of hundreds of students, their parents, their teachers, and members of the faculty of the University of Wisconsin. The Cooperative Research Program has made it possible to carry out certain phases of the program by supplementing the support provided by the University and 75 cooperating schools.

The persons who have contributed to the project are too numerous to list. We are particularly indebted to the 500 students who have given their time freely while they were students in high school. The graduate students who acted as research assistants have worked far beyond the call of duty. Professors on the University staff have contributed many hours without cost to the project. Members of the Laboratory advisory committee, particularly Dean Kurt F. Wendt of the College of Engineering and Dean Lindley J. Stiles of the School of Education, have arranged for excellent facilities in which to conduct the studies that have been done at the Laboratory. The Numerical Analysis Laboratory at the University has provided excellent services.

The study reported in the following pages extended over a three-year span. This is a relatively short period of time for the study of the complex problems one meets in the discovery and guidance of superior students. The data collected in the study reported here will be used many times as these subjects are followed through into their post-high school educational and vocational experiences. As the "moving pictures" of these subjects develop the "snapshots" obtained during the three-year period under review in the current studies may prove to be more significant than they now appear.

CONTENTS

		Page
PREFACE	. . . . .	i
CHAPTER I.	Background for the Study Reported in this Volume	1
CHAPTER II.	Introduction to the Problem	6
CHAPTER III.	Procedures	8
CHAPTER IV.	Results	18
APPENDIX A	Sample of Test (Exercises in Relationships)	
APPENDIX B	Tentative General Directions for Scoring	

TABLES

CHAPTER IV.

1. Frequency Distributions of Scores on Part A and Part B of the Analogies, by Sex and by Grade in High School . . 19
2. The Relationship of Sophomores' Performances on Analogies Part A with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; and the Watson-Glaser Critical Thinking Appraisal 24
3. The Relationship of Sophomores' Performances on Analogies Part B with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; and the Watson-Glaser Critical Thinking Appraisal 25
4. The Relationship of Seniors' Performances on Analogies Part A with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; the Terman Concept Mastery Test, Part I, Part II, and Total Raw Score; and with their Cumulative High School Grade Point Averages 26
5. The Relationship of Seniors' Performances on Analogies Part B with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; the Terman Concept Mastery Test, Part I, Part II, and Total Raw Score; and with their Cumulative High School Grade Point Averages 28
6. Extreme Groups of Seniors' Analogies Performances in Relationship to their Indicated College Choices of "More Verbal" and "Less Verbal" Major Fields 29

CHAPTER I

BACKGROUND FOR THE STUDIES REPORTED IN THIS VOLUME

Because the report of study in this volume grew out of a simultaneous attack on several significant problems related to the discovery and guidance of superior secondary school students, it seems desirable to precede the reports with a brief description of the setting in which they were attacked.

The Laboratory, which began as a small cooperative pioneering project of the School of Education and the College of Engineering in February, 1957, is now an officially recognized part of the University of Wisconsin. A committee composed of the Deans of Letters and Science, Engineering, Education, Law, Medicine, Agriculture, and representatives of the School of Commerce and the Extension Division advises the Director of the Laboratory. The work on the Madison campus is done by the writer and a staff of twelve graduate students in guidance. At the Wausau branch, which was opened in September, 1960, the work is done by a former staff member of the Madison Laboratory and one graduate student.

The seventy-five cooperating high schools were those which responded to a brief note in the bulletin of the State Department of Public Instruction to the effect that the University would cooperate with schools in experimentation on the discovery and guidance of superior students. The current participating schools provide an excellent sample of the secondary schools of the State in terms of size and geographic distribution. In size, the range is from schools with ten teachers to one with more than a hundred. This distribution is significant in view of the fact that most previous studies of superior students have been carried out in large cities or in large schools, and the bright student in the small school has received scant attention. Students are brought to the Madison Laboratory from some communities that are more than 250 miles distant. The schools provide for all travel expenses of the students and staff members who accompany them.

At the time the Laboratory was opened, a crucial decision about the method of selecting students was required. It would have been possible to direct the schools to send only those ninth grade students whose test scores were above some arbitrarily selected

figure. Instead of using methods of selection which put too much emphasis on test scores, the Laboratory staff encourages the schools to employ their own selection procedures. The following suggestions are given to the schools in written form, and they are discussed frequently in conferences and in school faculty meetings.

> Since superior students exhibit their superiority in many ways, no single score can be used as the sole criterion on which they should be selected. Teachers' judgments, evidence of a high level of performance in any of the academic fields, students' written performances, high grades, and evidence of high motivation coupled with high test scores can all be used in the identification of potentially superior students.
>
> In some schools, principals have asked teachers to nominate their superior students. The principal then joins a committee of teachers to review the nominations, considers such other factors as those noted above, and makes a list of all the top students nominated. Frequently the list of most highly rated nominees, along with the reasons for their selection, are returned to the teachers for further consideration.
>
> Combinations of some of the following characteristics are usually apparent in superior students.
>
> 1. Large vocabularies which are used easily and accurately.
> 2. Academic work one or more years in advance of their classes.
> 3. They ask many penetrating questions. They want to know the causes and reasons for things.
> 4. A wide range of interests but they may concentrate heavily on one.
> 5. Express themselves well in writing and speaking.
> 6. Spend much time on special projects of their own such as constructing, collecting and writing.
> 7. Tendency to figure out what is wrong with an activity and show how it can be done better.
> 8. Tendency to give refreshing twists even to old ideas.
> 9. They like to get answers to problems, puzzles, and trick questions.
> 10. Other students tend to turn to them for ideas and suggestions when something must be decided.
> 11. They read a good deal and find satisfaction in thinking about and discussing what has been read.

Selection procedures used by the schools have become more effective over the past four years. Average scores of ninth grade students sent to the Laboratory are at the 95th percentile on Form 1A of the School and College Ability Test. Their general performances in school, on other tests, and on written documents suggest that the schools are selecting students of high potential. Apparently teachers can recognize superior students when they are given assistance in doing so, and statements that commonly appear in the literature to the opposite effect seem to have been premature and based on inadequate data. There is evidence to suggest that the process employed at the Laboratory results in greater awareness by school personnel of the characteristics of the total school populations from which the Laboratory subjects are selected.

The Laboratory can take only a sample of the students in any school, demonstrate procedures with them, and encourage schools to use and expand upon the methods employed. The size of the sample from each school depends on the population of ninth graders, but some flexibility is permitted. If schools, after looking over their students, request an increase in the size of their quotas and even in some cases reduction of them, they are permitted to do so.

The students come to the Laboratory for the first time when they are in the ninth grade. They continue to come for a full day at least once each year until they graduate from high school. During their visits the students are tested and counseled. They write personal documents so that counselors can assess their writing skills and learn more about their background, problems, and plans, and they report on their activities orally and in writing. The total performance of the day is interpreted to the student, and all information obtained is shared with him. They are permitted to attend university classes in the subject area of their choice, and they are permitted to visit various studios and laboratories. When a student is beginning to express interest in a particular subject-field, an interview is arranged for him with an authority in that field, and the implications are discussed later with his counselor.

In some cases the students bring samples of their writing, art work, or other productions to the Laboratory for assessment by experts in their fields of interest. The professors give generously of their time for appraisal of the students' performances and provide constructive criticism and encouragement. At least one poet and several artists and writers of considerable promise have been discovered. All members of the university faculty who have been asked to confer with students, permit visits to their classes, and appraise their work have responded with enthusiasm.

After the student returns to his school, a report on each student is sent to the principal. It describes in two or three pages the students' performances, problems, and plans, and it ends with a number of suggestions which the school is asked to consider. The schools usually require each teacher who has the student in her classes to read the reports and follow the reading with participation in a group session in which they are discussed. In the smaller schools all members of the faculty read the report and participate in the discussions.

Members of the Laboratory staff visit the school for a full day shortly after the reports have been sent to the schools. At this time they meet with parents of all participating students. Conferences with parents of sophomores and juniors are held if they are requested. In most cases each father and mother has been seen separately for a short period to permit collection of research data, and then both parents have been brought together for a discussion of their child's performances, problems, and plans. The members of the Laboratory staff also confer with the students' teachers individually or in small groups, and the day is completed with a faculty meeting at which each staff member presents a report on the student with whom he worked. Vigorous discussion of particular students and of general methods of identifying and guiding superior students usually follows.

The Laboratory staff plans to follow these students for many years through their post-high school education and into employment. The first small group of trial subjects who had come to the Laboratory during their four years of high school were graduated in 1960. Follow-up procedures were tried out with them, and control groups of subjects from their college classes were selected. It is anticipated that some 250 new subjects will be added and that approximately the same number will be graduated each year. Continuation of Laboratory practices with those currently in high school and annual follow-up studies of the graduates of each year assures a large population for research purposes.

The Laboratory was designed primarily for research in the discovery and guidance of superior students. It serves also as a place where graduate students in guidance can get supervised practice in counseling and research in guidance. The wealth of longitudinal data permits and will continue to permit exhaustive studies on the characteristics, development, and guidance of the students. It also permits intensive studies of their family and school circumstances.

It was in the setting described above that the study reported in the following pages was carried out. It may be observed that the circumstances permit the follow-up of the subjects of such studies for many years and that there will be a continuing study of relationships among performances described in the following pages and the post-high school social, educational and vocational achievements of these subjects.

CHAPTER II

INTRODUCTION TO THE PROBLEM

The purpose of this study was to determine the potential value of a newly devised procedure for assessing verbal performances of superior high school students. On the basis of results reported herein, more extensive investigation will be carried on in the appraisal of verbal performances by means of analogies items which go beyond ordinary recognition and recall tasks demanded in most standardized tests.

It has been said that there have been no substantial advances in test item construction during the past thirty years, and that the present decade has been a time of adjustment and refinement in mental measurement. Techniques comparable in originality and significance to advances made during the first quarter of this century do not seem to be emerging. It has been essential at the Research and Guidance Laboratory for Superior Students (2) to develop measures which differentiate among subjects who all score very high on ordinary tests. It has furthermore seemed desirable that whatever measures are developed should place emphasis on ideas, processes and products rather than solely on material knowledge.

Analogy items, with the forms of the items differing slightly, constitute important parts of several instruments in current use and seem well established in educational testing. Generally the form requires the subject to complete an analogy from given alternatives. The use of free-response analogy items, however, has not been previously explored.

The instrument under investigation consisted of two parts. In Part A the student was given an analogy and asked to identify the one most logical relationship between the two elements in it. He was then asked to write the most precise description he could of the relationship he had identified. Part B required the student to construct another analogy statement comparable to the one given in the item. Thus the process of completing an item required three steps: (1) recognition of a relationship expressed in the given analogy, (2) explanation of the most logical relationship perceived, and (3) origination of a new analogy to demonstrate the relationship recognized. It was felt that by dividing the exercise into two parts, it would be less difficult to judge the degree of superficiality or essentiality with which the student responded. Part A was designed as a device for study of the student's reasoning

behind the comparable analogy he produced in Part B. Also underwriting the two separate parts was the hypothesis that items of this nature might be helpful in differentiating students capable of original performances from those who become highly skilled in the performance of usual recognition and recall tasks.

Before any evaluation of the new instrument could be made, it seemed imperative that some general descriptive questions be answered. Therefore the first part of the study was concerned with the following:

1. Is there a relationship between recognition of the elements of an analogy and creation of a comparable analogy?

2. Are there significant differences between the scores of boys and those of girls on either Part A or Part B of the analogies?

3. Do high school seniors score significantly higher than sophomores on either Part A or Part B of the analogies?

The second part of the study was concerned with determining whether performances on the experimental device were related to other characteristics of subjects as determined by performances on standardized tests, and in the case of seniors, academic performances and stated career choices.

CHAPTER III

PROCEDURES

Sample and Population

Experimental analogies items were administered under standard conditions to 143 tenth and 130 twelfth grade students who had attended the Research and Guidance Laboratory for Superior Students at the University of Wisconsin during the academic year 1964-65. The twelfth grade students had been administered the same items during the 1963-64 school year, when they were juniors. The exercise administered at that time was identical to the present instrument with the exception of six items which were deleted after the first administration (see Appendix B). The format of the exercise was also changed in order to facilitate reading and scoring. No new items were added (see Appendix A).

The seniors had visited the Laboratory at least once each year during four years of high school, at which times they had been counseled and had taken a variety of standardized tests. The sophomores were in their second year of an identical program. They had also completed several standardized tests.

The original selection of both groups was made by their teachers when the students were in the ninth grade. Although it is impossible to determine the exact criteria and methods employed by each high school staff in the selection and nomination of students to participate in the Laboratory program, the Laboratory had compiled a list of fifteen general suggestions which were discussed together by Laboratory staff members and high school faculties. While the schools were free to select the Laboratory participants in any way they desired and according to the faculty's local criteria, evidence from test scores and other performances suggest that the students comprised some of the best the high schools of Wisconsin have to offer.

Since this sample of students was drawn from the positive extremes of the distribution of intellectual competence and academic achievement, it is not representative of high school students in general. It represents approximately the highest three per cent of the general high school population in terms of academic proficiency as evidenced by high school grades and scores on standardized tests.

Instruments Used

Analogies: Development of the Trial Instrument

All Laboratory staff members were apprised of the nature of the research and were asked to contribute analogies which they thought would be suitable items. Approximately 100 were submitted and lists were made up for submission to staff members with the request that they choose items they thought would be most suitable. After the lists had been submitted, those selected for the second time were discussed at staff sessions, and thirty items on which most agreement was reached concerning suitability were selected for the test.

Directions for the first trial were prepared and the first form, containing 30 items was administered to 453 students in the following groups.

	Grade 10		Grade 11	
	Males	Females	Males	Females
Madison Laboratory Group	73	79	77	68
Wausau	38	41	34	43
Total	111	120	111	111

For the first step in the development of scoring keys, 100 randomly selected responses to both parts of each of the 30 items were typed on cards which contained no other identifying data. A committee of four graduate students under the supervision of the Director of the Laboratory and a project assistant then sought agreement on acceptability of the responses on the cards. The project director read the 100 responses for each of the 30 items, and each of the four committee members noted independently his judgment concerning the acceptability of the answers. If 3 of the four members indicated that the response was acceptable, it was agreed that it, and all others like it, would be marked "correct" in the scoring procedure.

Decisions about acceptability of items often required decisions which were to be written into the scoring protocol. (A scoring protocol was essential since the free response situation, and the possibility of getting unique answers, prevented the use of a key.) In the item, MATADOR is to ARENA as BALLERINA is to STAGE, for example, it was decided that there must be reference in the students' responses to a public place of performance. Thus, "boxer is to ring as figure skater is to rink" would be acceptable; whereas, "surgeon is to operating room as scuba diver is to sea" would not receive credit. Similar decision-making processes were required for each of the items.

Difficulty in getting agreement among scorers and some previously undetected errors in item construction resulted in the elimination of six of the original 30 items. Scoring protocols were set up for the remaining 24 items and scoring of the tests of the subjects was begun.

On the first attempt it was decided that scores of either 2 or 1 would be given to each answer to Part A. Two points were to be given to an excellent answer and one point for an acceptable one. Only one point was to be given for an acceptable answer to Part B. The later decision to eliminate the double value for Part A was made after attempts to get agreement among scorers proved futile.

Detailed description of analyses made on the scoring of the final form are not necessary here, in view of decisions made later, but it is interesting to note that of the 453 subjects only 19 (less than 5 per cent) scored markedly higher on Part B than on Part A. It appears that it was much easier for the subjects to recognize the relationships expressed in the given analogies than to make up a new statement in which a similar relationship was apparent. This finding, as shown later, was verified on the revised form.

Analogies: Revised Form Used in this Study

The revised form was exactly the same as the trial form with the exception of three changes: (1) the elimination of six items (Appendix A) which did not meet the criterion of item acceptability; (2) the ordering of the 24 items in adjudged ascending difficulty; and (3) the addition of one sentence (In constructing your comparable analogy do NOT use any of the words in the original analogy.) to the directions. With the exception of these three modifications, the revised test was the same as the trial test.

The changes in the analogies apparently made the test easier. As part of the investigation showed, seniors had a mean score of 6.65 when they had been administered the 30-item exercise as juniors. In contrast the mean score for sophomores was 8.78. Seniors had completed six items more than the sophomores and had been penalized if they used a word from the original analogy in their creation of a comparable analogy. They, unlike the sophomores, had not been advised that duplication of a word would result in loss of points. The revised form included such a warning in the directions.

Other Instruments

Relationships between students' scores on the analogies exercise and scores on standardized tests were studied. In the case of seniors, comparisons were made by using the Terman Concept Mastery Test, Form T, with a specific analysis of each of the two parts

(Part I Vocabulary; Part II Analogies) as well as of the total raw score; and the Verbal and Quantitative sections of the Wisconsin Inventory for Talented Students (WITS), developed at the Laboratory. This instrument is composed of items from standardized tests which were known to be difficult for superior high school students.

The two WITS tests used deserve particular discussion, since they were constructed to separate high verbal from high quantitative test performers within a population of superior high school students. The items for each of these tests were taken, with permission of the publishers, from standardized tests such as the Cooperative School and College Ability Tests, Form 1A; the Differential Aptitude Verbal Reasoning, Abstract Reasoning, and Numerical Ability Tests, Form 1A; and the Terman Concept Mastery Test, Form T. The 100 items on the WITS Verbal were divided into four parts; Synonyms and Antonyms, Analogies, Vocabulary, and Verbal Reasoning. The items on the WITS Quantitative were arranged in order of ascending difficulty. A complete discussion of the construction and use of these two tests was reported by Connell (1).

In the case of sophomores, analogies performances were studied in relationship to performances on the WITS Verbal and the WITS Quantitative. In addition to these two tests, the Watson-Glaser Critical Thinking Appraisal, Form AM, was used with sophomores.

Two other procedures were used in connection with seniors. Analogies, Part A and Part B, were studied in relationship to: (1) cumulative high school grade point average as reported by the schools and (2) seniors' choices of major fields in college, classified as "more verbal" or "less verbal," and described later in this report.

Methods of Data Collection

The analogies exercise was administered to small groups under standard conditions, allowing 45 minutes for completion of the 24 items. Earlier administrations of the same exercise had shown that for most students 45 minutes was adequate time for most subjects to complete the required items.

The first page contained directions and a sample problem. The directions were read aloud by the examiner while the student read silently to himself. The examiner then informed the students of the amount of time allowed for this exercise and advised students to complete both Part A and Part B. No further directions were given. Questions from students were not accepted during the time allowed for completing the exercise. The student was made aware of the passage of time, either by the examiner or by the presence of a clock in the testing room.

Scoring Procedure

A detailed protocol (Appendix B) was established and the scorer was obliged to follow specifications. Outstanding performance on this exercise required the student to identify and describe the most logical relationship he saw in each given analogy and then to create a comparable analogy. The task called for the student to shift frames of reference rapidly as he moved from item to item. The fact that the analogies items were open-ended allowed for the use of original ideas.

Two major criteria were used in the scoring of each relationship. The first was identification and explanation; the second production of an analogy reflecting the correct relationship.

Examples of responses which did and did not meet the criterion of appropriate identification are given below:

DULLARD is to DOLT as OAF is to SIMPLETON

Incorrect Identification:

"The first is a type of person considered to be very similar to the second."

Correct Identification:

"All four words are nouns meaning the same thing."

"Four synonymous words."

The second scoring criterion, production, required the scorer to decide whether the analogy the student produced followed logically from the one in the item given. Production was given credit only when the analogy originated by the student was judged to be an appropriate expression of the given relationship. If any elaborate relationships needed to be traced, or any assumption made by the scorer, no credit was given. Although this insistence upon directness might have penalized certain types of "novel" responses, it was impossible to tell what the student had in mind if it was not explicitly stated. This restriction probably helped avoid the possibility that the observed "correctness" existed in the minds of the scorers rather than the subjects. Of course, it can be argued that the original committee's concept of "correctness" was imposed on both scorer and student as it is in any test. A score of one (1) was given for each analogy that met the criterion.

Examples of responses which did and did not meet the criterion of acceptable production are given below.

DULLARD is to DOLT as OAF is to SIMPLETON

Incorrect Product

"Brain" is to genius as clown is to fool.

Such a response was regarded as incorrect since only the first two responses give the idea of synonymous words. The carry through, "clown is to fool" while "synonyms" for each other are not synonymous with "brain" and "genius."

Correct Product

"Dumbhead is to dunce as stupe is to fool."

"Bright is to smart as sharp is to keen-witted."

Here the student correctly grasped the idea of four synonymous words in each of the examples. The first shows the noun relationship; the second the use of four synonymous adjectives.

Scoring for seniors was done by one person who relied entirely on the protocol and his judgment as to the appropriateness or "correctness" of the responses for both Part A and Part B. He did not consult with other scorers, making all judgments independently. Taking each test, one test at a time, he marked both parts of the 130 senior exercises.

Another scorer, responsible for marking sophomore tests, scored Part A of the exercise independent of others' judgments but attempted to reduce the subjectivity of scoring Part B by: (1) grading, according to strict rules of the protocol, all items of which the scorer could be certain; (2) compiling a list of questionable responses; (3) giving four raters a list of questionable items which had been isolated, together with the appropriate protocol statements; and (4) using the per cent of inter-judge agreement as a reference for his decisions. Each judge, working independently, rated each questionable response and returned his decisions to the scorer, who used them as a basis for determining acceptability or non-acceptability of the response. An added precaution was used by the scorer of sophomore tests ... in that he scored each item one at a time on the 143 exercises for which he was responsible. For example, after reading the protocol statement for analogy number 1 (ENGINE is to CABOOSE as DAWN is to DUSK) the scorer marked the first question for all 143 students' responses. He continued this process throughout for the 24 items on the analogies exercise making a list of questionable items for use in inter-judge agreement study.

It was correctly assumed that scoring done in this manner would be more tedious. In spite of the added time and difficulty, it seemed more likely that such a procedure would facilitate remembering the protocol concept and nuances involved in each particular relationship.

The effectiveness of both procedures for scoring was estimated in terms of the intra-rater reliability. The intra-rater test-retest reliability coefficient of the senior scorer was found to be .79 for Part A and .87 for Part B of the analogies exercise. These figures were obtained by rescoring responses of 25 randomly chosen seniors and correlating results of the two scorings. The coefficient on sophomore analogy responses, scored in the manner described above, was .91 for Part A when a random sample of 25 was chosen from the total sophomore population of 143 exercises. The same procedure was followed with Part B on the sophomore analogies with an obtained coefficient of .97

A random sample of 25 of the senior tests which had been scored by one rater, working independently with the protocol and his judgment as his guide, was rescored by the rater of the sophomore tests. This rater used the more involved method of marking all tests, one item at a time. Inter-judge agreement coefficients were reported as .68 for Part A and .80 for Part B. An analysis of the ratings seemed to indicate that the main source of difference between the two raters was misunderstanding involving interpretations of the protocol, particularly in regard to Part A. After the two raters discussed the protocol more fully, fifteen exercises were chosen for rescoring by the same two persons, again working independently. This time the results indicated an inter-judge agreement coefficient of .73 for Part A and .89 for Part B.

As a further check, the two raters, again working independently but using the more involved procedure, scored 15 randomly chosen exercises administered to seniors when they had visited the Laboratory the previous year.* This time the coefficients obtained were .83 for Part A and .91 for Part B.

Finally, the results of 25 randomly chosen sophomore analogies were rescored by the rater of the responses of the sophomores and a graduate assistant who had not worked on the scoring previously. On the first trial, the naive scorer used the simpler method of marking all 25 tests, one test at a time. The scorer of the sophomore responses continued to mark for all 25 tests, one item at a time. This time the inter-rater reliability was .72 for Part A and .89 for Part B. When both scorers employed the more complex method for rescoring an additional 15 sophomore analogies, the inter-rater reliability was .89 for Part A and .93 for Part B. Then both scorers switched to the simpler method of one test at a time and the relationship was found to be .83 for Part A and .91 for Part B. It is quite likely that by this time, both scorers were aware of most of the subtleties of each of the concepts. The coefficients compare favorably with those commonly reported for such instruments.

---

*Seniors had taken the initial 30 item analogies test.

It had been originally intended to assign quality points for each item, depending on the degree of "excellence" of the response. In the actual scoring, however, this was not done with Part B, although there was some attempt to do so with Part A. Correct responses on Part A had been marked on a two-point scale, depending on an adjudged degree of understanding of the relationship involved. Part B, however, had been marked either 1 or 0 to indicate whether the answer was judged appropriate or inappropriate.

These preliminary trials, however, led to a reevaluation of the scoring procedure for Part A. Since there seemed to be so many inconsistencies in the protocol concerning Part A (Appendix B) and since the rating was so dependent on the person's interpretation, it appeared to be more practical to eliminate the quality-point procedure and simply count the number of relationships the students understood to some degree. An example of one item taken from the test, with its corresponding protocol explanation, may illustrate the complexity of deciding whether one or two quality points should be awarded for the student's explanation of the most logical relationship in the original analogy.

Test Item:

4. BENEVOLENT is to TYRANT as AGILE is to OX.

Protocol Statement:

4. Opposite characteristic of object. 1

Adjective-noun combination: adj. describes state directly opposite to that noun implies. 2

If the marker followed the protocol, only partial credit (1) could be given if the student did not state in his explanation the relationship adjective-noun. The full two points could be awarded the response only if the student had stated the adjective-noun combination.

Much the same was also true in scoring Part B of this item. Unless the response was made up of an adjective-noun combination with the adjective describing a state directly opposite to that which the noun implied, no credit was awarded the response.

It was felt that this revision of scoring of Part A did not hamper the study, since Part A had originally been placed in the analogies exercise as a device for studying the student's reasoning behind each response in Part B. The actual production of a comparable analogy, Part B, was felt to be the more important index of comprehension of the relationship.

The scoring for Part B was done on the basis of the number of acceptable original analogies the subject produced, with no regard to the quality of responses beyond that of acceptability. All four parts of the student's analogy had to meet the criterion of appropriateness before one point credit was given. A partially correct response was given no credit.

Although it was felt that the purpose inherent in the original idea concerning constructing a free response exercise might better be served by assigning degrees of "acceptable" or "acceptable and unusual or novel" to Part B, the evidence garnered from the study of the difficulties involved in the scoring of Part A acted as a dissuader at this time.

Methods of Analysis

Analogies results were used to establish preliminary norms for tenth and twelfth-grade subjects. The data were also analyzed by means of t-tests in order to determine whether performance on either Part A or Part B of the instrument was significantly different for boys than for girls, and whether there were significant differences in performance between sophomores and seniors. In each case, analysis was done separately for Part A and Part B. The relationship between performances on the two parts of the analogies was examined by means of Pearson product-moment correlation coefficients.

Analogies scores were also examined in the light of subjects' performances on several other measures. Chi-square coefficients of contingency were obtained as estimates of the degrees of relationship between sophomores' analogies scores and their scores on the WITS-Verbal, WITS-Quantitative, and the Watson-Glaser Critical Thinking Appraisal, Form AM. Similarly, seniors' analogies scores were examined in terms of their relationships to scores on the WITS-V, WITS-Q, The Terman Concept Mastery Test, Form T (Part 1, Part 2, and Total Score), and in terms of cumulative high school grade point averages earned by the subjects.

Finally, the results were analyzed by means of chi-square tests to discover whether seniors' performances bore any relationship to their choices of college major fields of study. For the purpose of this analysis, major fields were classified as "more verbal" or "less verbal" as listed below:

MORE VERBAL	LESS VERBAL
liberal arts (general course)	zoology
commerce	biophysics
business administration	biology
education	biochemistry
English	chemistry
Integrated Liberal Studies	science
language	physics
history	math
sociology	applied math and engineering physics
social work	data processing
psychology	agriculture statistics
political science	engineering
economics	medicine or pre-medicine
philosophy	pre-pharmacy
journalism	medical technology
home economics	nursing
	fine arts
	music

It was recognized that this was a rather arbitrary listing, as is probably always the case when classifications of this type are made. All college work requires a relatively high level of verbal performance. However, it was assumed that certain courses would require a lesser degree of verbal performance and depend more on other skills.

Another difficulty in classification arose when certain choices which might appear "less verbal" in preparation seemed to be highly verbal in practice, as in music. While music might involve other knowledges and skills to a large degree during college, it might lead to an occupation calling for a high degree of verbal performance.

In this chapter, methods and procedures employed in the study of a revised exercise in verbal relationships were described. The results of this investigation are reported in the following chapter.

CHAPTER IV

RESULTS

Descriptive Data

Answers were sought to three major questions of a descriptive nature. The first had to do with the students' performances on Part A as compared to Part B; the second was directed to possible differences between boys' and girls' performances on the instrument, and the third was concerned with differences in performance between sophomores and seniors.

1. Comparison of Part A (recognition and explanation) and Part B (origination) performances.

Part A of the experimental instrument called for each student to explain the most logical relationship he saw in each of 24 given analogies statements. Essentially his task on Part A involved recognition and explanation. Part B, on the other hand, called for the student to produce an analogy of his own, the elements of which were comparable to those in the given analogy. Thus, a student who was unable to put into words an explanation of the given analogy might be able to produce a comparable one as evidence of his understanding; and a student who was unable to think of a comparable analogy might be able to explain well the given one. A student who could do both tasks satisfactorily, of course, would receive the highest possible score for any given item. The question of concern here was whether students who could perform the explanation task well tended also to be the ones who could originate comparable analogies statements.

Figures in Table 1 on page 19 show that both sophomores and seniors typically achieved higher scores on Part A than on Part B. The mean scores for boys and girls at both grade levels were about twice as high for the former as for the latter. The total sophomore mean score (boys and girls combined) on Part A was 18.07 (SD = 2.78); whereas the total mean for Part B was 8.78 (SD = 3.00). Total senior means were 19.86 (SD = 2.85) for Part A and 9.55 (SD = 3.01) for Part B. Thus, performances of students at both grade levels were much higher and slightly less variable on Part A than on Part B.

Table 1. Frequency Distributions of Scores on Part A and Part B of the Analogies, by Sex and by Grade in High School

Raw Score	Sophomore Boys (n = 64)		Sophomore Girls (n = 79)		Senior Boys (n = 70)		Senior Girls (n = 60)	
Part	A	B	A	B	A	B	A	B
24	2				6		3	
23	1				9		7	
22	6		9		9		12	
21	7		5		9		5	
20	8		14		13		6	
19	10		10		7		3	
18	8		8		5		10	
17	7		9		2		4	
16	6		11		7	3	5	1
15	2	1	5	2	3	1		2
14	2	2	5	2		4		4
13		4	3	6		3	2	1
12	3	10		3		6	1	6
11		6		9		9	1	10
10	2	8		8		11		10
9		9		13		7		2
8		4		5		14		5
7		11		9		5		7
6		4		8		2		7
5		2		6		3		2
4		1		5		1		3
3		1		1		1		
2		1		1				
1				1				
0								
$\bar{X}$	18.32	9.28	18.10	8.54	20.17	9.76	19.50	9.47
SD	3.06	2.78	2.64	3.12	2.54	2.80	3.15	3.00

As the table shows, there was a "ceiling" which some students reached on Part A. Two sophomores and nine seniors scored the highest possible number of points on that section. Had the ceiling been higher, probably both means and standard deviations for Part A would also have been higher. None of the students at either grade level approached a perfect score on Part B. Highest scores were achieved by four seniors who each produced 16 correct analogies out of the possible twenty-four. Part B was clearly the more difficult task. It is suspected also that for most students, if not for all, it was certainly the more novel one.

Pearson product-moment correlation coefficients were obtained to examine the relationship between students' performances on the two parts of the exercise. In the case of the sophomore group the observed r was 0.536 ($p < .01$), and in the case of the senior group it was 0.440 ($p < .01$). These results indicate a significant positive relationship between the two types of performances, as might be expected in nearly any situation where two verbal performances are compared. Regardless of their statistical significance, however, the correlations do not indicate that performance on either type of task can be predicted with high accuracy on the basis of observed performance on the other type. When the correlation is in the neighborhood of .50, about 75 per cent of the variance is still left unaccounted for. In view of this consideration, the results were interpreted to mean that though the two types of performances were related, they were not the same. There are indications also, which will be discussed later, that the two types of performances may be affected differently by experiences during high school.

2. Comparison of performances of boys with those of girls on Part A and Part B of the analogies.

Figures contained in Table 1 show only negligible differences between mean scores for boys and for girls at each grade level. Means for boys were slightly higher than those for girls, but none of the differences approached statistical significance when tested by means of the students' "t." The t-values obtained are reported below:

Source	df	t
Part A		
Sophomore boys vs. girls	141	0.465
Senior boys vs. girls	128	1.320
Part B		
Sophomore boys vs. girls	141	1.520
Senior boys vs. girls	128	0.548

The critical value of t necessary for significance at the five per cent level for each test above is 1.98. These findings were interpreted to indicate that on neither Part A nor Part B is performance likely to vary systematically as a function of the sex of the student.

3. Comparison of sophomores' and seniors' performances on Part A and Part B of the exercises.

The mean score on Part A for all senior boys and girls was 19.86. For sophomores it was 18.07. The t-value associated with this difference was found to be 5.26 ($df = 271$, $p < .01$). On Part B the mean for seniors was 9.55 and for sophomores was 8.78. The obtained t-value for this difference was 2.12 ($df = 271$, $p < .05$). These findings support the hypothesis that performance on both Part A and Part B is associated with grade in school, which in turn is associated with age and experience.

In the case of Part B it seems worth mentioning that, though the difference between the two means was statistically significant, it appeared to be of little practical significance, being only a fraction of one point higher for seniors than for sophomores. It appears that the two additional years of education and experience the seniors typically had was of little effect insofar as their production performances were concerned. The mean difference for Part A was larger, and as suggested before, might have been larger still had there been no ceiling on it. Thus it would appear that the "recognizing and explaining" performances of the students may be improved somewhat as they progress from the tenth to the twelfth grade; whereas their "production" performances may be affected little. This conclusion is tentative and rests heavily on the assumption that performances of seniors and sophomores in this study can be thought of as primarily related to age and grade in school and not to some unknown systematic difference between the two groups.

Comparative Data

Three major hypotheses of a comparative nature were entertained. One was concerned with the extent to which analogies performances were related to other verbal and quantitative performances of the subjects, as they were measured by objective tests under standard conditions at the Laboratory. Another was concerned with the relationship between analogies performances and scholastic success, and a third was to determine whether scores on the analogies exercises were related to "more verbal" and "less verbal" categories of college major fields of study.

For sophomore students, scores achieved on the Verbal and Quantitative sections of the Wisconsin Inventory for Talented Students (WITS) and total scores on the Watson-Glaser Critical Thinking Appraisal were used for comparison purposes. For the seniors, WITS results and performances on the Terman Concept Mastery Test were employed. These instruments have been described previously. Analysis of school grades and major field choices in relation to analogies performances was restricted to senior students only, since the data needed were available only for that group.

1. How were performances on Part A and Part B of the analogies exercises related to performances on other tests?

In the following analyses, scores for boys and girls were combined, since evidence previously discussed was to the effect that there were no important sex differences in performance. Chi-square tests of independence were used for these analyses. Scores of sophomores were classified into highest, 2nd, 3rd, and lowest quarters with respect to each test. Since there were many ties, it was not possible for any of the score distributions to accomplish "quarters" containing exactly twenty-five per cent of the students. The range of scores involved in each quarter for each test is explained in footnotes under the following tables. In the case of the seniors, organization of the data by quarters led in several instances to such small theoretical frequencies that chi-square calculations could not be employed. Consequently the distributions were collapsed and the data were analyzed in terms of "upper half" and "lower half" classifications of scores on the several measures. Again because of ties, proportions of seniors classified into "halves" on each test varied somewhat from 0.50. In every case, the break was made between two score points which most nearly divided the group into two equal halves.

Tables 2 and 3 are contingency tables which contain data concerning sophomores' performances on Part A and Part B of the analogies exercises, respectively, as these performances relate to their scores on the WITS-V, the WITS-Q, and the Watson-Glaser Critical Thinking Appraisal (WGCTA). Frequency chi-squares associated with each of the comparisons are presented.

Figures in Table 2 reflect significant positive interdependence of sophomore scores on Part A with scores on both the verbal and the quantitative sections of the Wisconsin Inventory for Talented Students, and a trend toward interdependence of the same type between Part A scores and those achieved on the Watson-Glaser Critical Thinking Appraisal. The chi-squares obtained were 20.29 ($p < .05$) for the Part A vs. WITS-V analysis; 24.87 ($p < .01$) for the Part A vs. WITS-Q analysis; and 10.80 in the case of the Part A vs. WGCTA analysis.

Figures in Table 3 reflect positive relationships between Part B performances of sophomores and their scores on the other three measures. The chi-squares obtained were significant in the case of the Part B vs. WITS-Q analysis (37.15, $p < .01$) and the Part B vs. WGCTA analysis (23.2, $p < .01$). The WITS-V vs. Part B analysis did not yield a significant chi-square, but the trend toward interdependence was in the same direction.

It is perhaps interesting to note that both in the Part A and in the Part B analyses the non-significant chi-squares appeared to be associated with analogies performances vs. "least like" other measures. Part A (recognition and explanation performance) scores were significantly related to WITS-V and WITS-Q scores, but not to critical thinking performances. Multiple-choice items of the WITS-V might be thought of as "most like" Part A items in that they are verbal and require the student to recognize words, recall meanings, or recognize appropriate choices in a set of four alternatives. Items on the Watson-Glaser Critical Thinking Appraisal might be thought of as "least like" Part A items in that they require the student to draw inferences, interpret statements, make deductions, and otherwise go beyond data given to arrive at appropriate verbal conclusions. The reverse may be true in connection with Part B. Part B (productivity) scores were significantly related to WITS-Q and Watson-Glaser scores, but not to WITS-V performances. WITS-V items may be thought of as "least like" Part B items in that they do not require the student to follow processes and arrive at a product for his answers. Both the WITS-Q and the WGCTA do, but since the latter is the verbal measure and probably the more novel one to the students, it is perhaps "most like" Part B.

The significant relationship between the WITS-Q and both Part A and Part B is not paradoxical. In the first place, it is usual for students' verbal and quantitative test scores to correspond somewhat. In the second place, the WITS-Q items may call for both productivity (as does Part B) and recognition and recall (as does Part A) from the student.

Table 4, which follows, contains data concerning seniors' scores on Part A of the analogies exercises as these were related to their performances on both sections of the WITS, Parts I and II and Total Score on the Terman Concept Mastery Test (TCM), and their cumulative high school grade point averages as reported by their schools. Figures in the table are generally consistent with those in Table 2, insofar as they show either significant positive relationships or trends approaching significance for all comparisons except that involving grade point average. Significant chi-squares were obtained for the WITS-V vs. Part A (10.15, $p < .01$), the Part A vs. TCM II (4.71, $p < .05$), and Part A vs. TCM Total (11.61, $p < .01$) analyses. Comparisons of Part A performances with both the WITS-Q and the TCM I measures yielded statistics

Table 2. The Relationship of Sophomores' Performances on Analogies Part A with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; and the Watson-Glaser Critical Thinking Appraisal

	Analogies Part A Scores in the:					Chi-square
	Lowest Quarter	Third Quarter	Second Quarter	Highest Quarter	Row Total	(df = 9)
WITS-V scores:						
Highest Qtr.	5	9	11	14	39	20.29*
Second Qtr.	5	7	10	7	29	
Third Qtr.	10	11	12	7	40	
Lowest Qtr.	17	6	9	2	34	
Column Total	37	33	42	30	142	
WITS-Q scores:						
Highest Qtr.	3	8	11	15	37	24.87**
Second Qtr.	11	10	9	10	40	
Third Qtr.	8	6	13	4	31	
Lowest Qtr.	15	9	9	1	34	
Column Total	37	33	42	30	142	
WGCTA scores:						
Highest Qtr.	5	6	9	10	30	10.80
Second Qtr.	8	9	13	11	41	
Third Qtr.	12	9	9	6	36	
Lowest Qtr.	13	9	11	3	30	
Column Total	38	33	42	30	143	

*Chi-square .05 for 9df = 16.92
**Chi-square .01 for 9df = 21.67

Table 3. The Relationship of Sophomores' Performances on Analogies Part B with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; and the Watson-Glaser Critical Thinking Appraisal

	Analogies Part B scores in the:					Chi-square
	Lowest Quarter	Third Quarter	Second Quarter	Highest Quarter	Row Total	(df = 9)
WITS-V scores:						
Highest Qtr.	7	3	13	15	38	16.87
Second Qtr.	3	9	9	8	29	
Third Qtr.	7	8	10	16	41	
Lowest Qtr.	12	10	6	6	34	
Column Total	29	30	38	45	142	
WITS-Q scores:						
Highest Qtr.	1	2	12	23	38	37.15*
Second Qtr.	8	7	12	12	39	
Third Qtr.	8	10	9	6	33	
Lowest Qtr.	12	11	5	4	32	
Column Total	29	30	38	45	142	
WGCTA scores:						
Highest Qtr.	6	2	9	13	30	23.21**
Second Qtr.	4	7	16	15	42	
Third Qtr.	13	7	6	10	36	
Lowest Qtr.	7	14	7	7	35	
Column Total	30	30	38	45	143	

*Chi-square .05 for 9 df = 16.92
**Chi-square .01 for 9 df = 21.67

Table 4. The Relationship of Seniors' Performances on Analogies Part A with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; the Terman Concept Mastery Test, Part I, Part II, and Total Raw Score; and with their Cumulative High School Grade Point Averages

	Analogies Part A scores in:			Chi-square
	Lower half	Upper half	Row Total	(df = 1)
WITS-V scores:				
Upper half	30	42	72	10.15**
Lower half	40	18	58	
Column total	70	60	130	
WITS-Q scores:				
Upper half	33	39	72	3.48
Lower half	37	21	58	
Column total	70	60	130	
TCM (I) scores:				
Upper half	30	36	66	3.14
Lower half	40	24	64	
Column total	70	60	130	
TCM (II) scores:				
Upper half	37	43	80	4.71*
Lower half	33	17	50	
Column total	70	60	130	
TCM Total scores:				
Upper half	13	28	41	11.61**
Lower half	57	32	89	
Column total	70	60	130	
Grade point averages:				
Upper half	27	32	59	2.28
Lower half	43	28	71	
Column total	70	60	130	

*Chi-square .05 for 1 df = 3.84
**Chi-square .01 for 1 df = 6.64

approaching significance at the five per cent level. In each case, the tendency was for students who scored high on one measure to score high also on the other, and vice versa.

Table 5 contains the figures involved in the several comparisons of Part B performances with other measures. The chi-squares obtained reflect significant interdependence of seniors' performances on Part B with their scores on the WITS-V ($p < .05$), the WITS-Q ($p < .05$), and parts I and II as well as Total scores on the Terman Concept Mastery test ($p < .01$ in each case). The Part B vs. grade point average analysis yielded a chi-square (3.27) which approached statistical significance. Again, in the case of every analysis, the trend was in a positive direction.

A final analysis was done to determine whether analogies performances were related to "more verbal" or "less verbal" choices of college major fields by senior students. An explanation of how major fields were classified is contained in Chapter III on pages 16-17. For this purpose, only extreme groups of students were used. The Part A vs. major field comparison involved data concerning the 33 highest and 33 lowest scorers on Part A, minus seven students who were deleted because they had not selected major fields. The Part B comparison involved again the 33 highest and lowest scorers on that part, minus four who were deleted because of no major field. The final analysis involved all subjects who were among the highest and lowest scorers on both Part A and Part B and who also had made choices of major field. There were 59 students included in the Part A analysis, 62 in the Part B, and 33 (18 high scorers and 15 low scorers) on the A and B combined analysis. Table 6, which follows, contains the figures for each of these analyses.

As the figures in Table 6 show, there were no significant relationships between analogies scores and choices of major fields. In the case of the Part B and Parts A and B combined analyses, the slight trends were for the highest scorers to select the "less verbal" majors in college and the lowest scorers to choose the "more verbal" majors. If this seems odd, perhaps it is well to remember that no matter how one classifies college major fields, the business of attending college and doing successful work there is a verbal business. It could well be that in the classification scheme used here the major fields were separated into "more difficult" and "less difficult" categories about as accurately as they were into "more verbal" and "less verbal" ones. If this should be the case, then the trends noticed in the data in Table 6 might be more meaningful.

Table 5. The Relationship of Seniors' Performances on Analogies Part B with their Scores on the Wisconsin Inventory for Talented Students, Verbal and Quantitative; the Terman Concept Mastery Test, Part I, Part II, and Total Raw Score; and with their Cumulative High School Grade Point Averages

	Analogies Part B scores in:			Chi-square
	Lower half	Upper half	Row Total	(df = 1)
WITS-V scores:				
Upper half	38	34	72	4.74*
Lower half	42	16	58	
Column total	80	50	130	
WITS-Q scores:				
Upper half	37	34	71	6.42*
Lower half	43	16	59	
Column total	80	50	130	
TCM (I) scores:				
Upper half	33	34	67	8.33**
Lower half	47	16	63	
Column total	80	50	130	
TCM (II) scores:				
Upper half	42	38	80	6.74**
Lower half	38	12	50	
Column total	80	50	130	
TCM Total scores:				
Upper half	18	23	41	7.36**
Lower half	62	27	89	
Column total	80	50	130	
Grade point averages:				
Upper half	31	28	59	3.27
Lower half	49	22	71	
Column total	80	50	130	

*Chi-square .05 for 1 df = 3.84
**Chi-square .01 for 1 df = 6.64

Table 6. Extreme Groups of Seniors' Analogies Performances in Relationship to their Indicated College Choices of "More Verbal" and "Less Verbal" Major Fields

	College Choice of Major Field			Chi-square
	Less Verbal	More Verbal	Row Total	(df = 1)
Part A scores:				
In highest 27%	14	15	29	0.01
In lowest 27%	15	15	30	
Column total	29	30	59	
Part B scores:				
In highest 27%	18	12	30	2.33
In lowest 27%	13	19	32	
Column total	31	31	62	
Part A and Part B scores:				
Both in highest 27%	10	8	18	1.46
Both in lowest 27%	5	10	15	
Column total	15	18	33	

*Chi square .05 for 1 df = 3.84

Summary

In order to study the effectiveness of the newly revised analogies exercise to assess verbal performance in superior high school students, data were examined in terms of two categories which are summarized below.

Descriptive Data. The first category consisted of three major questions of a descriptive nature concerning students' performances on the analogies. One had to do with the students' performance on Part A (recognition) as compared to Part B (production); one was concerned with possible differences between boys' and girls' performances on the analogies; and one was in regard to differences in performance between sophomores and seniors. Both sophomores and seniors typically achieved higher scores on Part A than on Part B of the analogies. The mean scores for boys and girls at both grade levels were about twice as high for the former as for the latter.

Only negligible differences were found between mean scores for boys and for girls at each grade level. Means for the boys were slightly higher than those for girls, but none of the differences approached statistical significance.

The findings concerned with whether seniors scored significantly higher than sophomores on either Part A or Part B of the analogies supported the hypothesis that performances on both parts were associated with grade in school, which in turn is associated with age and grade. However, Part B performances seemed to indicate that the extra education, experience, and advantage of "practice" (the seniors having been administered an almost identical instrument their junior year) were of little effect insofar as their productive performances were concerned.

Comparative Data. The second category consisted of three major questions of a comparative nature. One was to investigate the extent to which analogies performances were related to other verbal and to quantitative performances of the subjects, as these latter were measured with objective tests administered under standard conditions at the Laboratory. Another was concerned with the relationship between analogies performances and scholastic success, and the third was to determine whether scores on the analogies were related to "more verbal" and "less verbal" classifications of college major fields of study.

Sophomores' performances on Part A of the analogies in relation to performances on other tests reflected significant positive interdependence of scores on Part A with scores on both the Verbal and the Quantitative sections of the Wisconsin Inventory for Talented Students, and a trend toward interdependence of the

same type between Part A scores and those achieved on the Watson-Glaser Critical Thinking Appraisal.

A positive relationship was evident between Part B performances of sophomores and their scores on the three measures mentioned above.

Seniors' scores on Part A of the analogies, as these were related to their performances on both sections of the Wisconsin Inventory for Talented Students (Verbal and Quantitative); Parts I and II and Total Score of the Terman Concept Mastery Test; and their cumulative high school grade point averages as reported by their schools showed either significant positive relationships or trends approaching significance for all comparisons except that involving grade point average. In each case, the tendency was for students who were high on one measure to be high on the other.

Scores on Part B of the seniors' analogies exercises reflected significant interdependence with their scores on the tests mentioned above. Relationship between Part B of the analogies and seniors' grade point averages approached statistical significance. Again, in the case of every analysis, the trend was in a positive direction.

There were no significant relationships between analogies scores and choices of major fields. There was a slight trend for the highest scorers to select the "less verbal" majors in college and the lowest scorers to choose the "more verbal" college majors.

The Future

The work described above was done as a pilot study of students' performances in producing responses to test items rather than choosing one from several which are presented. The insights into problems which are met and procedures necessary to solve them have suggested steps for further study in this area. Plans have been made to continue the work, a revision of the instruments is now under way, and schedules for its administration during the coming year have been arranged. The small contract under which the work was done has served the stated purpose of providing for exploratory work in use of a technique which now shows enough promise to warrant more intensive investigation.

References

1. Connell, Karen, "The Construction and Use of Two Tests to Separate High Verbal from High Quantitative Performers at the High School Level," Unpublished Masters' Paper, University of Wisconsin, August, 1963.

2. Rothney, John W. M., and Sanborn, Marshall P., "Wisconsin's Research-Through-Service Program for Superior Students," Personnel and Guidance Journal (in press).

Research and Guidance Laboratory for Superior Students
UNIVERSITY OF WISCONSIN
Madison

NAME _____

SCHOOL _____

DATE _____

GRADE _____

	No. Ans'd	No. Right	% Correct of Ans'd
Part A	_____	_____	_____
Part B	_____	_____	_____

% Discrepancy between Parts A and B ____

EXERCISES IN RELATIONSHIPS II

Listed below are 24 statements containing analogies. Each analogy is comprised of two phrases. For example:

CLOTHING is to SUITCASE as MONEY is to PURSE.

At least one logical relationship exists between the two phrases in the statement above. One logical relationship is that of the contained to the container. A SUITCASE can contain CLOTHING just as a PURSE can contain MONEY.

Your task in each of the following problems is twofold: (a) Study the statement and identify the one most logical relationship you see between the two groups of words. In the blank provided, write the most precise description you can of the relationship you see; (b) Using the relationship you identified as most logical, construct another analogy statement comparable to the one given. An example of a comparable analogy to the one given above might be:

MILK is to GLASS as PICTURE is to FRAME.

This statement applies the contained to container relationship in the first example.

Thus, to complete the sample problem, you would fill in the blank spaces as follows:

O. CLOTHING is to SUITCASE as MONEY is to PURSE.

(a) Write the most logical relationship you see.
Contained to container. A suitcase can contain clothing just as a purse can contain money.

(b) Your comparable analogy.
milk is to glass as picture is to frame

There is not necessarily one and only one correct answer to any of the following items. You may be able to identify two or three relationships. Your problem is to write the one most logical relationship you see, explain that relationship as precisely as you can, and construct a comparable analogy in the spaces provided. In constructing your comparable analogy do NOT use any of the words given in the original analogy.

It is important that you give each problem careful consideration, but do not spend too much time on any one item.

PRECEDING PAGE BLANK-NOT FILMED

1. ENGINE is to CABOOSE as DAWN is to DUSK.

   (a) Write the most logical relationship you see. Score

   _____ ___

   _____

   _____

   (b) Your comparable analogy.

   _____ is to _____ as _____ is to _____ ___

2. OUNCE is to POUND as INCH is to FOOT.

   (a) Write the most logical relationship you see.

   _____ ___

   _____

   _____

   (b) Your comparable analogy.

   _____ is to _____ as _____ is to _____ ___

3. MAN is to BREAD as MOTORCYCLE is to GASOLINE.

   (a) Write the most logical relationship you see.

   _____ ___

   _____

   _____

   (b) Your comparable analogy.

   _____ is to _____ as _____ is to _____ ___

4. BENEVOLENT is to TYRANT as AGILE is to OX.

   (a) Write the most logical relationship you see.

   _____ ___

   _____

   _____

   (b) Your comparable analogy.

   _____ is to _____ as _____ is to _____ ___

5. LIVED is to DEVIL as KNITS is to STINK.

   (a) Write the most logical relationship you see.

   _____ ___

   _____

   _____

   (b) Your comparable analogy.

   _____ is to _____ as _____ is to _____ ___

6. POLISHED is to GENTLEMAN as CRUDE is to BOOR.

(a) Write the most logical relationship you see. Score

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

7. MATADOR is to ARENA as BALLERINA is to STAGE.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

8. FISH is to FIN as BOAT is to RUDDER.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

9. TEACHER is to IGNORANCE as PHYSICIAN is to DISEASE.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

10. CAPITAL is to INVEST as RESIDENCE is to VOTE.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

11. PENINSULA is to LAND as BAY is to WATER.

(a) Write the most logical relationship you see. Score

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

12. DULLARD is to DOLT as OAF is to SIMPLETON.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

13. LOCKED DOOR is to KEY as ENIGMA is to SOLUTION.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

14. PIN is to POINT as PYRAMID is to APEX.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

15. APATHETIC is to ENTHUSIASM as INDIFFERENT is to ZEAL.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

16. LIGHT is to CANDLEPOWER as SOUND is to DECIBEL.

(a) Write the most logical relationship you see. Score

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

17. TABLE is to LEGS as ARGUMENT is to FACTS.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

18. ARNOLD is to HALE as TRAITOR is to HERO.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

19. HISTORICAL is to LEGENDARY as WASHINGTON is to PAUL BUNYAN.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

20. FLOOD is to WATER as AVALANCHE is to SNOW.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

21. ACADEMY is to STUDENTS as HOSPITAL is to PATIENTS.

(a) Write the most logical relationship you see. Score

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

22. NORTHEAST is to NORTH as SOUTH is to SOUTHEAST.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

23. ADVERSARY is to DUEL as CONSTITUENT is to GROUP.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

24. EIGHT is to ATE as TWO is to TOO.

(a) Write the most logical relationship you see.

_____ ___

_____

_____

(b) Your comparable analogy.

_____ is to _____ as _____ is to _____ ___

Analogies Test

GENERAL DIRECTIONS FOR SCORING

PART A

Total Possible Score = 48

Two Points. In order to receive the maximum number of points per item, which is 2, the participant must:

1. give an accurate precise statement of the relation;
2. follow statement with correct explanation of the relation (this step not mandatory);
3. follow vague statement of relation with clear explanation of relation;
4. clearly identify the entire relation as set forth in the Protocol (this means his answer clearly reflects relation set forth in Protocol).

One Point. In order to receive the minimum number of points per item, which is 1, the participant must:

5. clearly identify at least one part of the relation set forth in the Protocol if there are two or more parts;
6. correctly explain the relation if neglected to give precise statement of the relation as set forth in instructions;
7. if has inverted statement of relation, has correctly explained relation.

No Points. No credit is allowed for:

8. inaccurate statement of relation;
9. inaccurate statement of relation followed by correct explanation;
10. correct statement of relation followed by incorrect explanation;
11. no statement of relation and incorrect explanation of relation;
12. use of word from original analogy to state relation (the two exceptions to this rule are: Problem 12 in which "solution" may be used again; and, in the explanation of the relation where re-use is automatically necessary in nearly all cases).

EXAMPLES - PART A

Two Points. Number 19: Number to homonym. Just as ate sounds like eight, so does too sound like two. (1, 2, 4 above)

Homonyms. A number to another word sounding like it; already explained. (3, 4)

Number to homonym. (1, 4)

One Point Number 19: Homonym to homonym. (5)

Eight (a number) sounds like ate, just as two (a number) sounds like too. (6)

Word is to homonym. Eight sounds the same as ate but is not spelled the same way as two sounds like too but not spelled the same. (5)

Homonym to number. Eight, a number is to ate, its homonym, as two, a number is to too, its homonym. (7)

PRECEDING PAGE BLANK-NOT FILMED

No Points:

Number 19: Synonyms. (8)

Eight is pronounced as ate just as two is pronounced as too. (11)

Number 9: Support to case. A table must have legs in order to stand as an argument must have facts. (9)

Dependence is to dependence. A table depends on legs as an argument depends on facts. (11)

Number 11: Performer to stage or place of performance. (12)

Number 27: Synonyms. A dullard is a dolt and an oaf is a simpleton. (10)

PART B

Total Possible Score = 24

One Point. In order to receive the maximum number of points per item, which is 1, the participant must:

1. make up a new analogy which reflects the same relation as set forth in the Protocol;
2. make certain each answer reflects the whole relation as set forth in the Protocol.

No Points. No credit is allowed for:

3. answers that reflect reverse logic;
4. answers that incorporate one or more words from the original analogy;
5. answers that incorporate the same word more than once in the new analogy.

EXAMPLES - PART B

One Point Number 6: CAR is to STEERING WHEEL as BICYCLE is to HANDLE (1, 2)

No Points Number 6: STEERING WHEEL is to CAR as WIND is to PARACHUTE (3)

CAR is to STEERING WHEEL as PLANE is to RUDDER (4)

AIRPLANE is to WING as BIRD is to WING (5)

APPENDIX TO PARTS A AND B

Generally speaking, use of word from original analogy in either the statement of relation or in the comparable analogy is wrong. However, discretion must be used where a portion of a word used is reflected in the participant's answer.

EXAMPLES: Pin is to Point as Apex is to Pyramid.

A. Object to its POINTED end. R
A. Object to its APEX. W

B. Pencil is to POINT as Spear is to Tip. W
B. Pencil is to LEAD POINT as Spear is to Tip. R

Incomplete answers occurring in Part A or B are wrong.

Analogies Test

PROTOCCL FOR PART A AND B
(R = right and W = wrong response)
(Responses are unedited)

ITEM	PART		PROTOCOL VALUE	POINTS
1.	A.	Opposite ends or beginning to end.	2	
		Forerunner to follower.	2	
		R - Are exact opposites. An engine is first on a train and the caboose is last. Dawn begins the day; dusk ends it.		2
		Beginning to end. An engine begins a train and a caboose ends it just as dawn begins a day and dusk ends it.		2
		The first signifies the beginning, the second the end.		1
		W - Engine is before the caboose and dawn is before the dusk.		0
		Opposite ends of the object. An engine is on the opposite end of a train as the caboose and dawn is on the opposite end of day as dusk.		0
		End. Engine is ended by the caboose as the dawn is ended by the dusk.		0
	B.	Beginning to end and/or opposite ends.	1	
		R - Headlights is to tail-lights as prelude is to postlude.		1
		Life is to death as start is to finish.		1
		Young is to elderly as knowledge is to reason.		1
		W - Nose is to tail as CONTENTS is to index.		0
		Forward is to epilogue as SUN is to MOON.		0
		Table of contents is to bibliography as HOOD is to TRUNK.		0
2.	A.	Smaller unit of measure to larger;	2	
		Part to whole;	2	
		Smaller to larger.	2	
		R - Small measure to the next highest measure. 16 ounces make a lb. and 12 inches make a ft.		2
		Part to whole. An ounce is part of pound and inch is part of foot.		2
		Smaller unit to larger. An ounce is a fractional part of a pound as an inch is to a foot.		2
		W - One contained in the other. Ounce is contained in pound and inch is contained in foot.		0
		Weight to Measure. Ounces weigh pounds as inches measure feet.		0
		Amount to measurement. Ounces make pounds as inches make feet.		0
	B.	Smaller unit of measure to larger unit in same system.	1	
		R - minute is to hour as quart is to gallon		1
		pint is to gallon as peck is to bushel		1
		milliliter is to liter as centimeter is to meter		1
		W - FOOT is to yard as POUNDS is to tons		0
		½ is to ONE as ¼ is to ONE		0
		STUDENT is to CLASS as PLATE is to SET OF DISHES		0

PRECEDING PAGE BLANK-NOT FILMED

ITEM	PART		PROTOCOL VALUE	POINTS
3.	A.	Entity to fuel.	2	
		R - Object to thing it "runs" on. Cat is to meat as plant is to plant food.		2
		Object to what it needs to operate. Man needs bread to live just as a motorcyle needs gasoline to run.		2
		Bread and gasoline serve as "food."		1
		W - Fuel is to fire. Man receives energy from bread as motorcycle receives energy from gasoline.		0
		Object-need. Man uses bread and a motorcycle needs gasoline.		0
		Object to its subsistance.		0
	B.	Entity to fuel that makes it operate.	1	
		R - squirrel is to nuts as train is to steam		1
		furnace is to coal as train is to diesel (fuel)		1
		windmill is to wind as fire is to wood		1
		W - SUNLIGHT is to GREEN PLANTS as lightbulb is to electricity		0
		plant is to EARTH as fire is to WIND		0
		mind is to LEARN as bicycle is to BOY		0
4.	A.	Opposite characteristic of object.	1	
		Adjective-noun combination: adj. describes state directly opposite to that noun implies.	2	
		R - Benevolent & are adj's which modify the opposites of tyrant & ox.		2
		Benevolent & agile are adjective describing exactly oppositely the character of the nouns.		2
		Characteristics an adject does not have or isn't supposed to. A tyrant is never benevolent & an ox is the opposite of agile.		1
		W - Better to worse. Benevolent is to a tyrant as something agile is to an ox.		0
		Characteristic to thing bearing that characteristic.		0
		A trait of a tyrant is not benevolence while		0
	B.	Adjective-noun combination: adjective describes a state directly opposite to that noun implies.	1	
		R - innocent is to criminal as sweet is to "brat"		1
		evil is to priest as kind is to witch		1
		clumsy is to gymnast as stupid is to genius		1
		W - MEANESS is to Santa Claus as light is to night		0
		FREEDOM is to socialism as POVERTY is to wealthy		0
		GENERCUS is to philanthropist as FLEET is to fox		0

ITEM	PART		PROTOCOL VALUE	POINTS
5.	A.	Word to word spelled backwards.	2	
		R - Forward to backward - reading forward, the words are lived and knits; backward, they are devil and stink.		2
		Word to the same word spelled backwards. Lived is devil spelled backwards and knits is backward of stink.		2
		Spelled backwards.		2
		Lived is devil backwards and knits is stink backwards.		1
		W - Nothing to nothingness. Lived is nothing to Devil as knits is nothing to stink.		0
		No relation.		0
		Word to word with same letters in different order.		0
	B.	Word to word spelled backwards.	1	
		R - Top is to pot as keep is to peek.		1
		Deal is to lead as star is to rats.		1
		W - Mom is to WOW as GOD is to dog.		0
		KCAB is to back as TNORF is to front.		0
		TIM is to mit as pan is to nap.		0
6.	A.	Description to described.	1	
		Adjective to noun it describes.	2	
		R - Descriptive adjective to noun. Polished describes gentleman and crude describes boor.		2
		An adjective describing the second to the second. Polished is an adjective of gentleman and crude is one of boor.		2
		Distinguishing characteristic of person to person.		1
		W - Generalization to class.		0
		Rich to poor. Gentleman is rich as boor is poor.		0
		Action to result. To polish is to form a gentleman as something crude is a boor.		0
	B.	Adjective to noun it describes.	1	
		R - evil is to witch as greedy is to miser		1
		brilliant is to diamond as coarse is to sand		1
		fast is to greyhound as large is to elephant		1
		W - ABILITY is to genius as STUPIDITY is to moron		0
		well-mannered is to GENTLEMAN as stupid is to idiot		0
		finished is to COMPLETED as ruff is to beginning		0

ITEM	PART		PROTOCOL VALUE	POINTS
7.	A.	Performer to place of performance.	2	
		R - Performer to place where they perform.		2
		Performer to setting.		2
		Both arena and stage are places where the matador and ballerina perform.		1
		W - Person to place of performance. Matador does his performance in an arena and a ballerina does hers on a stage.		0
		Action to location. The matador is doing the action in the arena, the ballerina on the stage.		0
		The thing to the place where it performs. A matador performs in an arena and a ballerina on a stage.		0
	B.	Public entertainer to place of performance.	1	
		R - clown is to circus as star is to show		1
		pugilist is to ring as baseball player is to diamond		1
		musician is to concert hall as iceskater is to rink		1
		W - ENGINEER is to train as NURSE is to hospital		0
		GAME is to stadium as boxer is to ring		0
		ORCHESTRA is to pit as actor is to STAGE		0
8.	A.	Object to steering device;	2	
		Body to appendage or whole to part.	1	
		R - Steering mechanism to thing being steered. The fin controls motion of a fish like a rudder controls direction of a boat.		1
		Object to steering protrusion. Fish steers with fin, boat with rudder.		2
		Thing to its balancer. Fish can swim straight because of fin as boat can go straight because of rudder.		2
		W - Object to propeller. A fin propels a fish just as a rudder propels a boat.		0
		The second is an important part of the first.		0
		A fin controls a fish. A rudder controls a boat.		0
	B.	Mobile object to that part of object that acts as directional guide.	1	
		R - se[illegible] is to flippers as rowboat is to oars		1
		bi[illegible]s to wing as airplane is to aeleron		1
		ani[illegible] is to legs as car is to wheel		1
		W - man is to INTELLIGENCE as animal is to INSTINCT		0
		car is to steering wheel as plane is to RUDDER		
		RUDDER is to RAFT as TAIL is to FISH		0

ITEM	PART		PROTOCOL VALUE	POINTS
9.	A.	Person to condition he tries to dispel.	2	
		R - Person who works to get rid of, or obliviate, a condition to the condition.		2
		Conquerer to that to be conquered.		2
		Both the teacher and physician have problems to contend with. The teacher - ignorance and physician disease.		1
		W - The diagnoser is to the problem diagnosed. The teacher tries to expell ignorance, as the Dr. tries to expell disease.		0
		Cure to ailment; teacher "cures" ignorance - physician cures disease.		0
		Remedy to defect.		0
	B.	Professional person to condition he tries to dispel.	1	
		R - lawyer is to injustice as social work is to bad conditions		1
		fire chief is to fire as policeman is to crime		1
		scientist is to superstition as phsyciatrist is to mental disease.		1
		W - TREATY is to war as lawyer is to CRIME		0
		Fireman is to fire as jail is to CONVICTS		0
		Minister is to SINFUL as FIGHT is to war		0
10.	A.	Prerequisite for the action to the action or Necessity to action.	2 2	
		R - Qualification to privalege.		2
		Requirements to act.		2
		Both capital and residence are necessities. You must have capital to invest and residence to vote.		1
		W - Good to better.		0
		Reason to reasoned. Capital is reason to invest just as residence is reason to vote.		0
		Necessary detail to given ability. Capital is a necessary detail to give ability to invest as residence is necessary detail to give ability to vote.		0
	B.	Prerequisite for the action to action, noun-verb relation essential.	1	
		R - money to buy as material is to sew		1
		food is to eat as strength is to work		1
		land is to farm as paper is to print		1
		W - money is to spend as TIME is to live		0
		time is to ACTIVITY as age is to VOTE		0
		flour is to bake as virus is to DISEASE		0

ITEM	PART		PROTOCOL VALUE	POINTS
11.	A.	Object to composition;	1	
		Part to whole;	1	
		Projection to its composition.	2	
		R - Projection from something larger. Penninsulus part of land that sticks out into water - Bay part of water projecting into land.		2
		Projection to mass; a peninsula is a projection of a land mass as a bay is a projection of a water mass.		2
		An object compared to what it is made of.		1
		Appendage to body. The peninsula is an appendage of land just as a bay is an appendage of water.		1
		W - Isolated section of whole. A peninsula is an isolated section of land. A bay is an isolated section of water.		0
		Land to water. A peninsula is a piece of land as a bay is a body of water.		0
		Isolated to whole. A peninsula is to all the land as a bay is to the whole body of water.		0
	B.	Projection to its composition; or object to composition.	1	
		R - wing is to airplane as conning tower is to submarine		1
		glacier is to ice as desert is to sand		1
		finger is to hand as point is to star		1
		W - COURT is to GOVERNMENT as JUDGE is to COURT		0
		CRATER is to VOLCANO as CLOUD is to SKY		0
		PEROXIDE is to oxygen as CORNMEAL is to corn.		0
12.	A.	Four synonymous words.	2	
	B.	Four words synonymous in meaning reflecting correct idea behind Part A. (Part A must be correct to receive credit for Part B.)	1	
		R - A. All half-wit-likeness of mental condition.		2
		B. Bright is to smart as sharp is to keen-witted.		1
		A. Comparison of like objects.		2
		B. _____ is to _____ as _____ is to _____.		0
		A. All 4 words are synonomous.		2
		B. Crazy is to insane as "nuts" is to"touched."		1
		A. Relation of similar meanings. The relation of the pairs is the same relation of any two of the four.		2
		B. Big is to large as huge is to monstrous.		1
		A. Words that all mean the same thing.		2
		B. Rat is to fink as creep is to twink.		1
		W - A. An adjective for a person compared to a similar adjective.		0
		B. Smartie is to brain as NUT is to DUMBHEAD.		0

ITEM	PART		PROTOCOL VALUE	POINTS
		W -		
		A. A dolt is a dullard. A simpleton is an oaf.		0
		B. _____ is to _____ as _____ is to _____.		0
		A. Synonomous. A dullard is a dolt, & an oaf is a simpleton.		0
		B. Hog is to pig as DOG is to HOUND.		0
		A. A dullard is a dolt just as an oaf is a simpleton.		0
		B. Student is to scholar as TEACHER is to EDUCATION.		0
		A. Synonym to synonym. Dullard is a synonym of dolt as oaf is a synonym of simpleton.		0
		B. Intellectual is to genius as MORON is to IDIOT.		0
13.	A.	Problem to its solution.	2	
		R - Object to opener. A door is to a key as an enigma is to the solution.		2
		Problem to its answer. Key opens door, enigma opens solution [student's arrows for reverse order].		2
		Answer is to problem. Key is an answer to a door (locked) as solution is an answer to an enigma.		1
		W - Large thing with only 1 way through. Hill is to tunnel as dress is to buttonhole.		0
		Puzzle to unopening. The puzzle of a door can be unlocked by a key. An enigma can be unopened with a solution.		0
		That which needs unlocking to that which is locked. Key unlocks door and solution unlocks or solves, an enigma.		0
	B.	Problem to its solution.	1	
		R - locker is to combination as question is to answer		1
		passing a course is to good grades as inclusion is to qualification		1
		mental problem is to physician as can is to can opener		1
		W - misbehavior is to punishment as cows is to MILKING		0
		BUTTON is to ELEVATOR as CLOCK is to alarm		0
		problem is to answer as glass is to ROCK		0

ITEM	PART		PROTOCOL VALUE	POINTS
14.	A.	Whole to its peak or climax or smallest part or end or top (adequately explained).	2	
		R - An object compared to the most outstanding trait of its shape.		2
		Object to tip of object.		2
		A point is the tip of a pin just as the apex is the tip of a pyramid.		1
		W - The first works its way up to the second. A point is at the top of a pin while an apex is at the top of a pyramid.		0
		Pins and pyramids exist at only one point, in points and apex, and that one point makes them what they are.		0
		Object to its high point. A pin and apex are high points as pins and pyramids.		0
	B.	Whole to its peak or climax.	1	
		R - arrow is to arrowhead as obelisk is to top		1
		day is to midnight as universe is to infinity		1
		triangle is to vertex as eyes is to focal point		1
		W - flagpole is to FLAG as pencil is to ERASER		0
		nail is to POINT as cone is to APEX		0
		HEAD is to MAN as ROOF is to HOUSE		0
15.	A.	Opposites.	1	
		Opposites; 1:3, 2:4 synonymous relation.	2	
		R - Apathetic is opposite of enthusiasm as indifferent is opposite of zeal.		1
		First term is opposite adjective of second words which are synonyms in nominative case.		2
		Attitude to opposite attitude. Enthusiasm & zeal both show ambition; indifference & apathetic show lack of interest or laziness.		2
		W - Unzestful to zestful. Enthusiasm is more zestful than apathy as zeal is more zestful than indifference.		0
		Not wanting to (to) wenting to.		0
		Quiet conservative to acting radical.		0
	B.	Paired words having opposite meanings and reflecting synonymous 1:3 and 2:4 relation.	1	
		R - gentle is to harsh as soft is to hard		1
		avid is to listless as eager is to dull		1
		tired is to energy as exhausted is to freshness		1
		W - dead is to LIFE as LOVING is to HATE		0
		stoical is joyous as _____ is to _____		0
		laziness is to labor as listlessness is to INDUSTRY		0

ITEM	PART		PROTOCOL VALUE	POINTS
16.	A.	Object to its appropriate unit of measure.	2	
		R - A property or substance compared to that which measure it.		2
		Energy to measure. Candle power measures light as decibels measure sound.		2
		W - The second gives off the first. A candle gives off light and a decibel gives off sound.		0
		Sense to what produces it.		0
	B.	Anything that can be measured to its appropriate unit of measure.	1	
		R - length is to feet as weight is to ounce		1
		time is to era as height is to inches		1
		resistance is to ohm as inductance is to henry		1
		W - heat is to FURNACE as odor is to PERFUME		0
		warmth is to FIRE as light is to SUN		0
		heat is to FIRE as cold is to ICE		0
17.	A.	Whole to its supporting part (base, foundation, etc.).	2	
		R - Supported to supporter. Table is supported by legs as argument is supported by facts.		2
		First based on second. A table is based on legs, as an argument is on facts.		2
		Legs are the basis for holding up a table just as facts are the basis for holding up an argument.		1
		W - Object which must rely on other objects to other objects. A table must have legs; an argument must have facts.		0
		You need legs in order to have a table as you need facts in order to have an argument.		0
		Object or thing as to what is in it. A table has legs same as an argument has facts.		0
	B.	Whole to its supporting part but not necessarily integral part of whole.	1	
		R - theorem is to proofs as success is to work		1
		car is to wheels as house is to foundation		1
		I.C.U. is to cash as combustibles is to spark		1
		W - BEAMS is to CEILING as MAST is to SAIL		0
		car is to wheels as dog is to LEGS		0
		house is to BASEMENT as music is to notes		0

ITEM	PART		PROTOCOL VALUE	POINTS
18.	A.	Bad to good; or degraded to respected; or opposites or proper noun to noun.	2	
		R - Opposites. Benedict was opposite of Hale; traitor is opposite of hero.		2
		Bad guy to good guy.		2
		Failing to confidence: Arnold failed in his loyalty where Hale kept confidence, as a traitor fails his cause where a hero has confidence in it.		2
		Arnold was a traitor just as Hale was a hero.		1
		W - Goal is to substandard. Hale is a goal to Arnold as hero is a goal to traitor.		0
		Opposite to enemies. Arnold is the opposite of Hale as traitors are enemies of heroes.		0
		Traitor to hero. Benedict Arnold was a traitor and Nathan Hale a hero. Words are the same way.		0
	B.	Opposite proper nouns with opposite and parallel descriptive nouns.	1	
		R - Oswald is to Dooley as killer is to saver		1
		Kennedy is to Krushev as capitalist is to communist		1
		Burr is to Hamilton as defeater is to promoter		1
		W - Bur is to Hamilton as BAD is to GOOD		0
		HOCKEY PLAYER is to TEACHER as delinquent is to society		0
		BLACK is to WHITE as bandit is to sheriff		0
19.	A.	Fact-fiction; real-fairytale; person to quality possessed, or synonyms.	2	
		R - Real to imaginary. Historical is real to the made-up legendary as Washington is real to the imaginary Robin Hood.		2
		Fact to fiction. Historical and Washington refer to factual evidence as legendary and Robin Hood are based on ficticious evidence.		2
		Historical is factual, legendary is ficticious; Washington is factual, Robin Hood is ficticious.		1
		W - Variation to variation. Legendary is a variation of historical as Robin Hood is a variation (legend) compared to Washington.		0
		Washington and Robin Hood are examples.		0
		Historical to Robin Hood. Washington is historical as Robin Hood is legendary.		0
	B.	Descriptive fact-fiction adjective to fact-fiction proper nouns.	1	
		R - fact is to fake as Einstein is to Rip Van Winkle		1
		real is to uncertain as Caesar is to Aeneid		1
		future is to science fiction as John Glenn is to Flash Gordon		1
		W - BUFFALO BILL is to PECOS BILL as NONFICTION is to FICTION		0
		PRESENT is to ANCIENT as Johnson is to Egyptians		0
		FLORENCE NIGHTENGALE is to LITTLE RED RIDING HOOD as John Glenn is to Flash Gordon		0

ITEM	PART		PROTOCOL VALUE	POINTS
20.	A.	Whole (or quantitative amount) to composition;	1	
		Destructive event of great magnitude to composition. .	2	
		R - Some devastating force compared to the simple substance which is a part of it.		2
		Destructor to content. A flood contains water as an avalanche contains snow.		2
		Excess of X to X. A flood is an excess of water and an avalanche is an excess of snow.		1
		W - The first has the second as maker of the first. Much water makes a flood as much snow can cause an avalanche.		0
		Disaster to means of disaster. Flood is a disaster caused by water just as an avalanche is a disaster caused by snow.		0
		Result is to cause. Flood is caused by excess water, as avalanche is caused by excess snow.		0
	B.	Destructive event of great magnitude to composition.	1	
		R - tornado is to wind as rockslide is to rocks		1
		gullying is to rain as erosion is to wind		1
		cyclon is to wind as storm is to rain		1
		W - SUGAR is to DIABETES as POISON is to DEATH		0
		hurricane is to wind as drought is to HEAT		0
		typhoon is to wind as CONFLAGRATION is to fire		0
21.	A.	Institution (or building) to occupants;	1	
		Container to contained;	1	
		Social institution to human patrons or clients served.	2	
		R - Place or location to resident; students reside at an academy as most patients reside in a hospital.		1
		Container to contained. People go to these places for a purpose which the container serves.		2
		Helping institution to applicants. Academy aids applying students in wanted studies and a hospital aids the applying sick and diseased.		2
		W - Both are places to better yourself at.		0
		Living quarters to people. Students stay at academy just as patients stay at hospital.		0
		Place is to place. Academy is where students study as hospital is where patients recover.		0
	B.	Social institution to human patrons or clients served.	1	
		R - church is to congregation as resort is to overworked man.		1
		clinic is to musicians as gym is to athlete		1
		motel is to traveler as library is to readers		1
		W - HOME is to FAMILY as HABITAT is to ORGANISMS		0
		NEST is to BIRD as MONESTERY is to MONKS		0
		OFFICE is to BUSINESSMEN as nursery is to babies		0

ITEM	PART		PROTOCOL VALUE	POINTS
22.	A.	One is counterclockwise to other;	1	
		proportion of 1:2 is same as 3:4;	1	
		(1 + 2).	2	
		R - Position to one going counterclockwise. Northeast to north moves 1 step counterclockwise & same with south to southeast.		2
		The first is 45° further in a clockwise direction than the second.		2
		Both are directions just 45° from their partners. NE is 45° east of North as South is 45° west of SE.		1
		A position on the compass or a position on a circular scale to 45° backwards on that scale. North being 0°.		1
		W - Subdirection to direction. Northeast is a subdirection of North just as southeast is a subdirection of South.		0
		Eastern variation of direction is eastern variation of direction.		0
		Direction to direction. Northeast and north are directions and south and southeast are directions.		0
	B.	Position to counterclockwise movement of equal proportion.	1	
		R - 3:00 is to 12:00 as 9:00 is to 6:00		1
		180° is to 225° as 90° is to 135°		1
		semidark is to dark as half truth is to lie		1
		W - up is to 38° CLIMB as low is to 380 FT. BELOW SEA LEVEL		0
		CUP is to CONTAINER as AMERICA is to ENGLISH		0
		Northwest is to NORTH as SOUTH is to southwest		0
23.	A.	One:two as one:two or more	2	
		Part to whole.	1	
		R - Single part to total - as every duel must have two adversaries, so must every group have constituents.		2
		Component - number relationship; a member of a duel (2 people) is an adversary while the group (many people) consists of many constituents.		2
		A part is to a whole. An adversary makes part of a duel and a constituent is part of a group.		1
		W - Member to group - one person in a group is a constituent, one person in a duel is an adversary.		0
		Part is to the result. There must be an adversary to be a duel and there would be no group without constituents.		0
		Member to organization. An adversary is a member of a duel as a constituent is		0
	B.	One:two as one:two or more.	1	
		R - opponent is to match as member is to society		1
		mate is to marriage as citizen is to nation		1
		singer is to duet as drummer is to combo		1
		W - truck is to CONVOY as pilot is to crew		0
		delagate is to CONVENTION as student is to class		0
		member is to JURY as father is to family		0

ITEM	PART		PROTOCOL VALUE	POINTS
24.	A.	Homonyms.	1	
		Homonyms, two numbers and two not.	2	
		R - Number to homonym. Eight sounds the same as ate, as two sounds the same as too.		2
		Homonyms. A number to another word sounding like it; already explained.		2
		Word to homonym.		1
		W - same sound in words		0
		Form is to word. While eight and ate are pronounced the same, they are really different words altogether.		0
		Word to synonym. Eight and ate are synonyms and two and too are synonyms.		0
	B.	Four is to for (or fore) as one is to won.	1	
		R - four is to for as one is to won		1
		W - NIGHT is to KNIGHT as WHERE is to WEAR		0
		FOR is to fore as THERE is to THEIR		0
		ONE is to WON as FOUR is to FOR		0
		ONE is to WON as NINE is to NEIN		0